Air Quality in Alberta
April to June, 1999

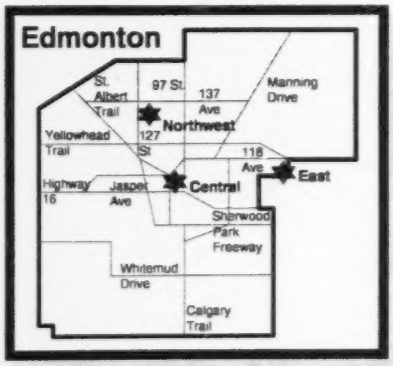
Alberta Environment continuously monitors air quality in Edmonton (three stations), Calgary (three stations), Fort Saskatchewan and Beaverlodge (35 km west-northwest of Grande Prairie). Air quality parameters monitored at Alberta Environment stations include carbon monoxide, dust and smoke, oxides of nitrogen, ozone, total hydrocarbons, hydrogen sulphide, sulphur dioxide, carbon dioxide, ammonia and particulates (PM_{10} and $PM_{2.5}$). The Index of the Quality of the Air (IQUA) is calculated at the Edmonton, Calgary and Fort Saskatchewan stations. The IQUA converts air parameter concentrations into ***Good***, ***Fair***, ***Poor*** and ***Very Poor*** air quality ratings.

Highlights

- **The frequency of *Good* air quality ratings was better than or close to the same as the 10-year average (1989 to 1998) at most monitoring stations in the second quarter of 1999.** However, ***Good*** air quality was from two to nine per cent less frequent than the 10-year average at the Calgary East and Edmonton East monitoring stations. A corresponding increase in ***Fair*** air quality was evident at these two stations. ***Fair*** air quality at these locations was primarily due to ozone generated during warm, sunny weather conditions in April and May. The majority of this ozone was generated by natural processes such as: (1) chemical reactions involving organic chemicals from vegetation and naturally occurring oxides of nitrogen in the presence of sunlight; and (2) transport of ozone from the upper atmosphere. Both of these processes are enhanced by warm, sunny weather conditions. Elevated ozone levels in east Edmonton and Calgary may have also been influenced by organic chemicals and oxides of nitrogen emitted by vehicles and industry in the Edmonton and Calgary areas.

- ***Poor* and *Very Poor* air quality were not reported at any monitoring stations from April to June 1999.**

- **Concentrations of pollutants emitted by automobiles were lower than the 10-year average at most stations in the second quarter of 1999.** Carbon monoxide concentrations were from 16 to 28 per cent lower than the 10-year average while nitrogen dioxide levels were from three to 16 per cent lower than the 10-year average at Edmonton and Calgary stations. Average dust and smoke values at Edmonton monitoring stations were from 14 to 54 per cent lower than the average from 1989 to 1998. The major sources of carbon monoxide, nitrogen dioxide and dust and smoke in Edmonton and Calgary are vehicle exhaust emissions. Lower concentrations of these pollutants were due to lower emissions from more efficient automobiles.



For current air quality conditions call ***427-7273*** in Edmonton and ***250-2099*** in Calgary.

Alberta
ENVIRONMENT

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☞ **Alberta's air quality guidelines for carbon monoxide, nitrogen dioxide and sulphur dioxide were not exceeded at any monitoring stations in the second quarter of 1999.** The maximum one-hour concentrations for carbon monoxide and nitrogen dioxide were 5.4 and 0.072 ppm (parts per million), respectively. These concentrations are 42 and 34 per cent of the respective one-hour guidelines for carbon monoxide (13 ppm) and nitrogen dioxide (0.210 ppm). The maximum one-hour sulphur dioxide concentration, 0.027 ppm, was recorded at the Edmonton East station. This value is far below the sulphur dioxide one-hour guideline of 0.170 ppm.

☞ **The one-hour guideline for hydrogen sulphide was exceeded three times at the Edmonton East monitoring station.** These exceedances were recorded on April 22 (6 a.m.), June 3 (9 a.m.) and June 18 (5 a.m.). The maximum hydrogen sulphide concentration was recorded on June 3 at a value of 0.017 ppm. The one-hour guideline for hydrogen sulphide is 0.010 ppm. Elevated total hydrocarbon concentrations were also measured at the Edmonton East monitoring station on June 12 (8 a.m. and 8 p.m.) and June 18 (6 a.m.). The highest one-hour average total hydrocarbon reading occurred at 8 a.m. on June 12 (16.4 ppm). Normal background total hydrocarbon concentrations are about 2.0 ppm. Elevated hydrogen sulphide and total hydrocarbon values were likely caused by fugitive emissions, or leakages, from nearby industrial activities. Alberta Environment investigations determined no enforcement action was required.

☞ **The one-hour guideline for ground-level ozone was not exceeded from April to June 1999.** However, the 24-hour guideline for ozone was exceeded frequently at rural monitoring stations because of naturally high levels of ozone in the atmosphere. This guideline was most frequently exceeded 80 of 91 days at the Beaverlodge station. Ozone is present naturally in the atmosphere in spring and summer due to: (1) chemical reactions that occur in the presence of sunlight involving organic chemicals and oxides of nitrogen emitted by natural sources; and: (2) transport from the ozone-rich upper atmosphere to ground level through normal atmospheric mixing. Lower ozone concentrations are recorded in city cores because naturally occurring ozone is destroyed by nitric oxide from vehicle exhaust emissions. The 24-hour guideline for ozone is currently under review by a federal-provincial committee because of high natural levels.

Number of Times Air Quality Guidelines were Exceeded - April to June, 1999

Station	Carbon Monoxide		Dust and Smoke	Hydrogen Sulphide		Nitrogen Dioxide		Ozone		Sulphur Dioxide	
	1-hour	8-hour	monthly	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour
Edmonton Central	0	0	0	n/a	n/a	0	0	0	38	n/a	n/a
Edmonton Northwest	0	0	0	n/a	n/a	0	0	0	49	n/a	n/a
Edmonton East	0	0	0	3	0	0	0	0	79	0	0
Calgary Central	0	0	0	n/a	n/a	0	0	0	28	n/a	n/a
Calgary Northwest	0	0	0	n/a	n/a	0	0	0	69	n/a	n/a
Calgary East	0	0	0	0	0	0	0	0	43	0	0
Fort Saskatchewan	0	0	0	0	0	0	0	0	78	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	80	0	0
Guideline	13 ppm	5 ppm	90% of values< 1 COH unit	0.01 ppm	0.003 ppm	0.21 ppm	0.11 ppm	0.082 ppm	0.025 ppm	0.17 ppm	0.06 ppm

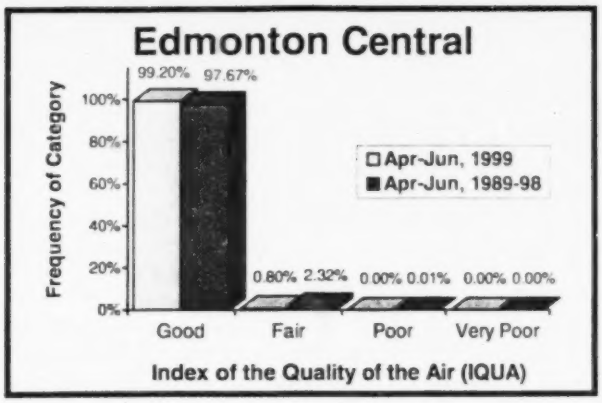
n/a Parameter not monitored or data not available.

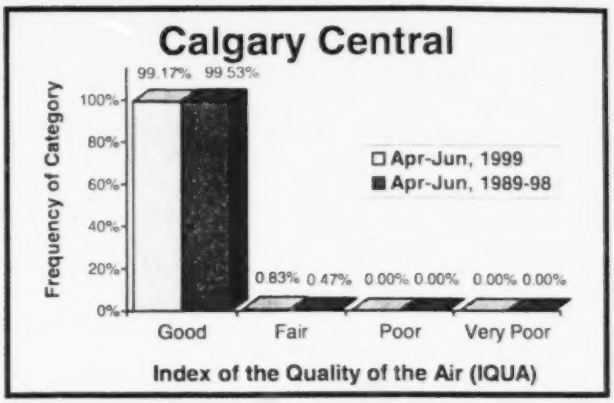
The Index of the Quality of the Air

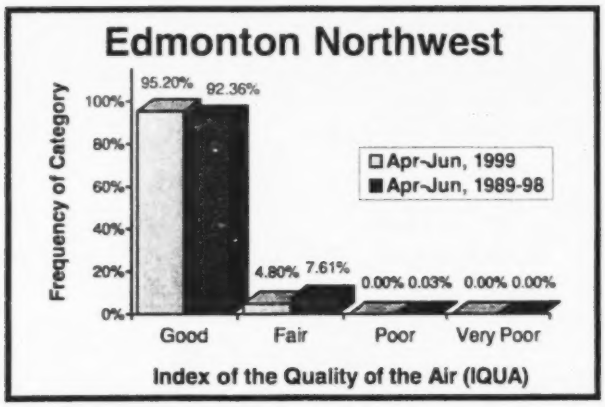
The index of the quality of the air (IQUA) provides the public with a meaningful measure of outdoor air quality. The IQUA is calculated every hour at all Edmonton, Calgary and Fort Saskatchewan monitoring stations. From this index, we can effectively rate air quality as Good, Fair, Poor or Very Poor. Air pollutants used to calculate the IQUA are carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide. Good, Fair, Poor and Very Poor air quality categories are directly related to guidelines under Alberta's Environmental Protection and Enhancement Act, and National Air Quality Objectives.

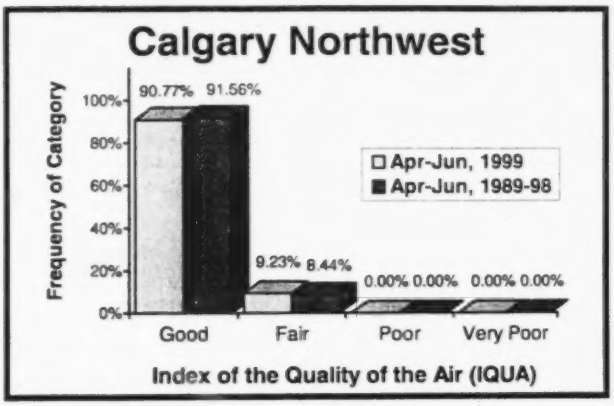
IQUA rating	Description
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
Poor	Tolerable range: not all aspects of the environment are adequately protected from possible adverse effects. Long term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
Very Poor	Intolerable range: in this range, continued high readings could pose a risk to public health.

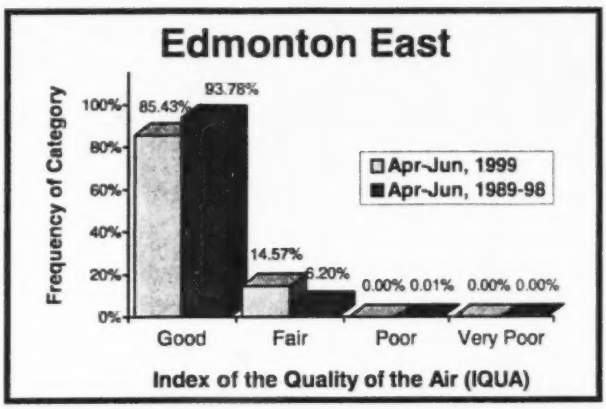
Source: Environment Canada. 1980. Guideline for a short-term air quality index. A report by the Federal-Provincial committee on Air Pollution.

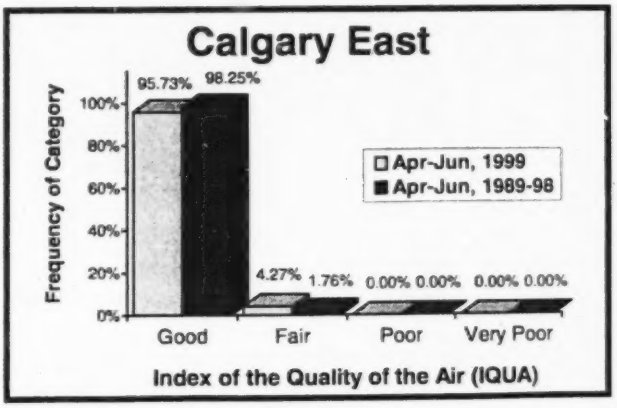

Edmonton Central
Frequency of Category
100%
80%
60%
40%
20%
0%
99.20% 97.67%
0.80% 2.32%
0.00% 0.01%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

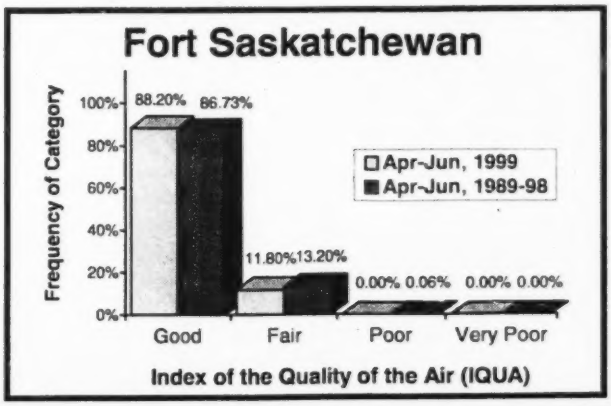

Calgary Central
Frequency of Category
100%
80%
60%
40%
20%
0%
99.17% 99.53%
0.83% 0.47%
0.00% 0.00%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Edmonton Northwest
Frequency of Category
100%
80%
60%
40%
20%
0%
95.20% 92.36%
4.80% 7.61%
0.00% 0.03%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary Northwest
Frequency of Category
100%
80%
60%
40%
20%
0%
90.77% 91.56%
9.23% 8.44%
0.00% 0.00%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Edmonton East
Frequency of Category
100%
80%
60%
40%
20%
0%
85.43% 93.78%
14.57% 6.20%
0.00% 0.01%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary East
Frequency of Category
100%
80%
60%
40%
20%
0%
95.73% 98.25%
4.27% 1.76%
0.00% 0.00%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Fort Saskatchewan
Frequency of Category
100%
80%
60%
40%
20%
0%
88.20% 86.73%
11.80% 13.20%
0.00% 0.06%
0.00% 0.00%
Apr-Jun, 1999
Apr-Jun, 1989-98
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

Average Concentrations - April to June, 1999 [a]

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Fort Saskatchewan	Beaverlodge
		Central	Northwest	East	Central	Northwest	East		
Carbon Monoxide (ppm)	Apr-Jun 1999	0.59	0.52	0.32	0.60	0.39	0.50	0.36	n/a
	Apr-Jun 1989-98	0.81	0.65	0.38	0.84	0.47	0.65	0.33	n/a
Dust and Smoke (COH unit)	Apr-Jun 1999	0.09	0.12	0.06	0.14	0.07	0.19	0.04	n/a
	Apr-Jun 1989-98	0.15	0.14	0.14	0.16	0.06	0.17	0.06	n/a
Hydrogen Sulphide (ppm)	Apr-Jun 1999	n/a	n/a	0.000	n/a	n/a	0.001	0.000	n/a
	Apr-Jun 1989-98 [b]	n/a	n/a	0.000	n/a	n/a	0.001	0.000	n/a
Nitrogen Dioxide (ppm)	Apr-Jun 1999	0.019	0.016	0.012	0.024	0.011	0.021	0.008	0.002
	Apr-Jun 1989-98	0.022	0.018	0.013	0.028	0.013	0.023	0.009	n/a
Ozone (ppm)	Apr-Jun 1999	0.025	0.028	0.034	0.023	0.032	0.025	0.033	0.038
	Apr-Jun 1989-98 [c]	0.024	0.027	0.030	0.021	0.031	0.023	0.033	0.035
Sulphur Dioxide (ppm)	Apr-Jun 1999	n/a	n/a	0.002	n/a	n/a	0.002	0.002	0.003
	Apr-Jun 1989-98 [d]	n/a	n/a	0.002	n/a	n/a	0.002	0.001	n/a
Total Hydrocarbons (ppm)	Apr-Jun 1999	1.82	1.98	2.17	2.00	2.00	2.19	1.76	n/a
	Apr-Jun 1989-98	2.10	1.91	2.11	2.05	1.89	1.99	1.87	n/a
Carbon Dioxide (ppm)	Apr-Jun 1999	n/a	n/a	n/a	395	n/a	n/a	n/a	n/a
	Apr-Jun 1992-97	n/a	n/a	n/a	381	n/a	n/a	n/a	n/a
Particulate (PM_{10} in $\mu g/m^3$)	Apr-Jun 1999	n/a	20.5	18.3	20.0	n/a	n/a	n/a	n/a
	Apr-Jun 1994-97 [e, f]	n/a	24.6	n/a	28.3	n/a	n/a	n/a	n/a
Particulate ($PM_{2.5}$ in $\mu g/m^3$)	Apr-Jun 1999	n/a	12.3	n/a	8.4	n/a	n/a	n/a	n/a
	Apr-Jun 1998 [g]	n/a	n/a	n/a	12.7	n/a	n/a	n/a	n/a
Ammonia (ppm)	Apr-Jun 1999	n/a	n/a	n/a	n/a	n/a	n/a	0.004	n/a
	Apr-Jun 1989-98	n/a	n/a	n/a	n/a	n/a	n/a	0.005	n/a

a All average values based on data collected from April to June.

b Average hydrogen sulphide at the Edmonton East station for April to June 1991-1998.

c Average ozone for the Beaverlodge station is for April to June 1998.

d Sulphur dioxide monitoring began in February 1999 at the Beaverlodge station.

e Average PM_{10} at the Calgary Central station for April to June 1996-1998 and average PM_{10} at the Edmonton Northwest station for April to June 1994-1998.

f PM_{10} monitoring began in April 1998 at the Edmonton East station.

g $PM_{2.5}$ monitoring began in November 1997 at the Calgary Central station and in April 1998 at the Edmonton Northwest station.

n/a Parameter not monitored.